A STUDY OF CATALYSIS OF COAL GASIFICATION AT ELEVATED PRESSURES

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ABSTRACT

Bench-scale tests were conducted to determine the effect of additives and catalysts upon the steam-gasification of coal at high pressure. Gasification was conducted in 0.6" diameter fixed beds at 300 psi and 750 to 950 C. Over 20 chemical compounds and additives were evaluated at 850 C in standard gasification tests. Data are presented which show that nearly all of the additives tested increased the overall rate of carbon gasification significantly, with alkali metal compounds resulting in the largest increases (over 60%). Generally, the increase in hydrogen production greatly exceeded the increase in carbon gasification, indicating that the tested additives promoted the water gas shift reaction. The additives also increased methane production by up to 20 percent. Additional experiments are discussed concerning the effectiveness of Raney Nickel as a catalyst when it is admixed with the coal, when it is sprayed on a metal surface and then inserted in the coal bed, and when used at temperatures of up to 950 C. The effect of other parameters is also considered, such as the degree of gasification and the recycle of additives. Results of the overall investigations thus far suggest that the gasification step of the Bureau of Mines Synthane process can be improved significantly by means of suitable catalysts.